

REMARKS/ARGUMENTS

Status of the Application

Prior to the entry of this amendment, claims 24-46 were pending in this application. In the Office Action all claims were rejected under 35 U.S.C. § 102(b) and claims 32 and 33 were also objected to as being of improper dependant form.

The present amendment cancels claims 24, 40, 41, 43 and 44. Other existing claims have been amended. New claims 47-54 are now added.

New independent claim 47 is directed to a method of treating a subterranean formation (as was former claim 43) and also includes features found in previous claims 24 and 44. Claim 47 also requires that the viscoelastic gel is a micellar solution: it is made clear in the opening description (page 1 line 24) and in the prior literature which is discussed that viscoelastic gels are surfactant solutions. Micelle formation by surfactants is well known and the formation of worm-like micelles is explicit at page 12 lines 22 and 28. Claims, 25, 27-39 and 42 have been amended to be dependant on new claim 47. New dependant claim 48 is based on former claim 39 and new claim 49 is based on part of claim 33.

New independent claim 50 is based on previous claim 24 with a requirement as to the anionic surfactant based on claim 33. New independent claim 51 is again directed to a method, as in claim 43 and contains the requirements of claim 44 with reference to worm-like micelles as in claim 47. New dependent claim 52 specifies the cationic surfactant named in claim 33.

Claim 45 has been directed to a method, as in former claim 43. Both claims 45 and 46 have been amended to include reference to worm-like micelles as in claim 47. New claims 53 and 54, dependant on claim 46, are based on original claims 19 and 16.

Therefore, claims 25-39, 42 and 45-54 are presented for examination in this amendment. No new matter is added by the amendments or by the addition of the new claims. Applicants respectfully request reconsideration of this application as amended.

Claim objections

The spelling of stabilizing in claim 32 has been amended. The examiner objected that claims 32 and 33 were not properly dependant. Claim 47 specifies that the surfactant which forms the viscoelastic gel is ionic, but does not restrict to anionic. It is submitted that this removes the inconsistency noted previously and it is requested that the objection is withdrawn.

35 U.S.C. §102 Rejections

The present invention is concerned with compositions in which a surfactant forma a viscoelastic gel. The property of viscoelasticity is observed when the surfactant in solution takes the form of worm-like micelles, sometimes referred to a rod-like or cylindrical. This is well documented. It is briefly stated in the Zhou reference WO 02/64946 on page 2 at lines 9 to 11. It is explained at some length in the article entitled “Surfactants, Micelles and Fascinating Phenomena” by Hoffman et al listed as item BC on the IDS submitted in 2006.

It is also well documented that the formation of these very elongate micelles requires that something is added to force the surfactant solution away from the formation of simple spherical micelles which do not give viscoelastic properties. The Hoffman et al paper draws a distinction between globular micelles and elongate micelles in the right hand column of its first page. At the bottom of that column and going on to the top left of the next page it is explained that elongate micelles and consequent viscosity can be obtained on mixing two things together. The paper by Rehage and Hoffman listed as BE on the same IDS has a section 6, beginning on its page 943 that opens with the sentence: “The phenomenon of viscoelasticity can be induced by addition of specific additives to some surfactants”.

It has become known that viscoelastic properties can be induced by means of a sufficiently high concentration of salt. In the present application the discussion of background art mentions on page 2 at lines 8 and 9 that a salt concentration of 3 to 12% is typical.

It is also acknowledged in the opening part of the present application text that the incorporation of an alcohol or other polar non-ionic compound in a viscoelastic composition is

known. However, the prior art does not reveal the finding of the present invention that by incorporating an alcohol or other polar non-ionic compound, viscoelastic properties can be achieved with a low concentration of salt which would previously have been regarded as inadequate.

In formulating rejections, the Examiner took the view that wording in the prior references disclosed salt within the claimed range. Without any admission as to this, claim 47 have now been worded to require a concentration of salt which is more than zero and less than 1%. Most claims have been worded or amended so that they are directed to a method of treatment in which the specified wellbore fluid is injected below ground.

Claims 24-31, 34-40, 42, 43, 45 and 46 were rejected as anticipated by Whalen US 6035936.

Patentability of claim 47 (replacing claim 24) over Whalen. Whalen teaches viscoelastic compositions for use below ground in which viscoelasticity is achieved by means of surfactants. The compositions may include an organic alcohol, and they may include a salt. The typical amount of salt is presented as ranging from 1% upwards. In the examples of Whalen the compositions are formulated in a solution of ammonium chloride containing 2% ammonium chloride or more or else are formulated in seawater. Sea water contains more than 1% salt and the Official Action has not alleged otherwise. It is notable that the preparative procedure mentioned at the top of column 7 of Whalen, just before the examples, states that the hydrophobic organic alcohol was added “after the surfactants were added to the brines”. Here Whalen appears to have no concept of doing without brine.

The Office Action points out that Whalen column 4 refers to the constituent surfactants being in an aqueous medium at line 15. The aqueous medium is part of the fracturing fluid. Then at line 24 comes an assertion that the fluids are “capable of being used in both fresh and salt water environments.” On a literal reading of the text, that is a statement that after the fluid has been formulated, it may be used in an environment where water is present and that the environment water concerned is fresh. It is not a clear and explicit statement that the

formulations may be prepared using fresh water. Whether Whalen intended something other than what is written is speculation. Moreover, even if fresh water is used to make the composition, the salt content may come from salts present in the supplies of surfactants used. Applicants submit that this passage fails to disclose any viscoelastic composition prepared using a salt-free supply of surfactant(s) and fresh water. As mentioned above this brief reference to fresh water is not supported by any exemplification of a salt free composition.

As mentioned above, the background literature teaches that formation of a viscoelastic composition requires something to induce the surfactant to form elongate micelles. Whalen fails to explain or demonstrate what is happening if his surfactants are truly capable of adopting a viscoelastic state in the absence of salt. Hence, in view of the teaching in the background literature it appears that Whalen fails to enable the reader to identify a composition which will possess viscoelasticity in the absence of a salt concentration much below 2wt% (which is the lowest percentage in his examples).

Applicants submit that Whalen does not disclose a composition which has, in combination, both the alcohol and a salt concentration below 1 wt%.

In addition, Whalen is now distinguished by the requirement for worm-like surfactant micelles. Column 4 line 21 of Whalen states that his compositions are typically in the form of an *emulsion*. This is reinforced by column 7 line 26, column 9 line 6 and other references to *emulsion* in the Examples. An emulsion and a solution of worm-like micelles are not the same. Thus Whalen is teaching away from the invention as claimed in new claim 47.

Patentability of claim 51 over Whalen. The arguments above generally apply. In addition, Whalen does not teach use of cationic surfactants.

Patentability of claims 45 and 46 over Whalen. Both of these claims are distinguished by the requirement for worm-like surfactant micelles.

Patentability over Zhou

The Examiner has rejected claims 24-33 and 41-45 as anticipated by Zhou WO 02/64946. Zhou discloses compositions for injection below ground in which there are two surfactants in the composition and one surfactant decomposes below ground to liberate an alcohol or an amine. The top of page 18 teaches that a composition of Zhou may contain salt in a quantity of 1 to 10 wt% preferably 3 to 4 wt%. This paragraph on page 18 also teaches that a composition may include alcohol when injected. The Examples on subsequent pages of Zhou are laboratory experiments, but they consistently use 3 wt% or more of salt.

As regards new claims 47 and 51, Zhou does not disclose the required combination with

a composition containing a hydrophilic-lipophilic compound as required which contains salt in an amount which is above zero yet is below 2 or below 1 wt% and

is intended for injection below ground.

As regards claim 45, It is noted that the Office Action did not point out disclosure by Zhou of the requirements which this claim stipulates for the organic compound.

CONCLUSION

In view of the foregoing, Applicants believe all claims now pending in this Application are in condition for allowance. The issuance of a formal Notice of Allowance at an early date is respectfully requested.

In the event that a fee or refund is due in connection with this Amendment, the Commissioner is hereby authorized to charge any underpayment or credit any overpayment to Deposit Account No 19-0615. If the Examiner believes a telephone conference would expedite prosecution of this application, please telephone the undersigned at.

Respectfully submitted,

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